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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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WASHINGTON, DC 20005

EXAMINER

CHACKO DAVIS, DABORAH

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1756

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/781,803

Applicant(s)

BABA-ALI ET AL.

Examiner

Daborah Chacko-Davis

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 08/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6-7, 9-15, 17-19, 21-31, are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,541,026 (Matsumoto).

Matsumoto, in the abstract, in col 2, lines 60-67, in col 3, lines 1-64, in col 7, lines 14-67, in col 8, lines 1-9, and in col 11, lines 10-27, discloses an optical system used in a method of transferring an image onto a wafer comprising performing an exposure on a wafer (wafer coated with photoresist (negative or positive) layer) with polarized light beams, wherein the light (unpolarized illumination source) emitted from the light source is polarized by a polarizing means (pattern polarizing device); the polarized light beams traverse an optical path (optical axis direction aligned with the focus of the projection optics) and are transmitted in a predetermined direction through a phase-shift mask in a predetermined pattern (image pattern, polarization pattern) to form a circuit pattern (contact holes) on the wafer (printing on wafer) (claims 1, 7, 11-15, 17-19, 26-27).

Matsumoto, in col 8, lines 10-21, discloses that the polarized light is projected in a radial illumination mode through the phase-shift mask (claims 2, 22, and 29). Matsumoto, in col 7, lines 45-54, discloses that the polarized light is transmitted in a tangential illumination mode through the phase-shift mask (claims 3, 23, and 30). Matsumoto, in

Art Unit: 1756

col 10, lines 33-48, discloses that the polarized light can be projected through any polarizing means (any dimension, custom polarization pattern) to produce an image (pattern) with high-contrast (claims 4, 24, and 31). Matsumoto, in col 3, lines 1-10, and lines 36-49, discloses that the projection system emits polarized light to the photomask (pre-polarized light) to perform the exposure (claim 6). Matsumoto, in col 12, lines 5-28, in col 16, lines 59-67, and in col 17, lines 1-12, discloses that the exposure can be performed through either an attenuating phase-shifting mask, or an alternating phase-shifting mask or a chromeless phase-shifting mask (the dark portions are formed on the mask without using any light-shielding film on it) (claims 9, 25, 28). Matsumoto, in col 12, lines 5-26, discloses that certain portions of the phase-shift mask are dark portions (with light shielding film on the dark portions) and certain portions are light transmitting portion (binary mask) (claim 10). Matsumoto, in col 3, lines 1-5, discloses that the pattern polarizing means is included in projection optical system (pupil plane of the projection optics) (claim 21).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1756

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,541,026 (Matsumoto) in view of U. S. Patent Application Publication No. 2002/0176166 (Schuster).

Matsumoto is discussed in paragraph no. 3.

The difference between the claims and Matsumoto is that Matsumoto does not disclose that the polarizer produces a polarized light that is in a quadrupole illumination mode (claim 5).

Schuster, in [0053], discloses that the polarizer in the illumination system projects a quadrupole illumination mode to perform an exposure.

Therefore, it would be obvious to a skilled artisan to modify Matsumoto by employing the illumination mode suggested by Schuster because Schuster in [0053], discloses that selecting such an illumination mode results in a large, sharply defined and highly homogenous illuminating field.

5. Claims 8, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,541,026 (Matsumoto) in view of U. S. Patent No. 5,539,514 (Shishido et al).

Matsumoto is discussed in paragraph no. 2.

The difference between the claims and Matsumoto is that Matsumoto does not disclose that a liquid is filling a space between the projection optic and the wafer to perform an exposure through a liquid path (claims 8, and 20).

Shishido, in col 29, lines 19-21, and in figure 61, discloses that liquid means can

Art Unit: 1756

be provided in the optical path length of the illuminating unit.

Therefore, it would be obvious to a skilled artisan to modify Matsumoto by employing a liquid means in the optical path length of the projection system as suggested by Shishido because Shishido, in col 29, lines 14-24, discloses that providing liquid means in the projection path length enables the provision of optical path correcting units that are deformable or are capable of continuously changing the optical path length.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,541,026 (Matsumoto) in view of U. S. Patent No. 5,467,166 (Shiraishi).

Matsumoto is discussed in paragraph no. 2.

The difference between the claims and Matsumoto is that Matsumoto does not disclose that the polarizing device is a waveplate (claim 16).

Shiraishi, in col 14, lines 11-37, discloses that the polarizing member (polarizing device) is either a half wavelength plate or a quarter wavelength plate.

Therefore, it would be obvious to as skilled artisan to modify Matsumoto by employing the wavelength plates suggested by Shiraishi because Shiraishi, in col 12, lines 53-67, and in col 13, lines 1-19, discloses that using wavelength plates as the polarizing member results in the projection of polarized beams that do not interfere with each other at the wafer interface (during exposure), such that the individually polarized beams (non-interfering) are amplitude-combined and form images (intensity distribution) with increased depth of focus.

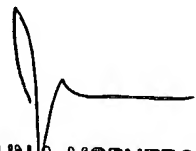
Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd



September 24, 2004.



JOHN A. MCPHERSON
PRIMARY EXAMINER